A

CALFED Bay-Delta Program
Resource Categories and Assessment Variables
For the Programmatic EIR/EIS
Draft

1/29/97

I. PHYSICAL ENVIRONMENT

A. Surface-Water Hydrology

Important Changes to be Evaluated	*Related Information to be Measured*
Volume of flow	Rainfall Snowmelt Groundwater discharge Direct runoff Evapotranspiration from program features (soil moisture, vegetation [e.g., terrestrial, agricultural crops, riparian, wetlands], open-water area)
Timing of flow	Seasonal weather pattern variation

B. Groundwater Hydrology

Important Changes to be Evaluated	*Related Information to be Measured*
Groundwater supply	Basin storage capacity Groundwater recharge Groundwater withdrawals
Conjunctive use supply	

C. Riverine Hydraulics

Important Changes to be Evaluated	*Related Information to be Measured*
Depth, width, and velocity	Slope of water surface and channel bed Channel or floodplain roughness (resistance) Water viscosity Hydrographs Channel geometry Instream and bank erosion: channel loss; riparian loss (e.g., from channel migration, recreation, wind, current); gravel loss; conveyance loss Sediment movement Channel geomorphology

D. Water Management Facilities and Operations

Important Changes to be Evaluated	*Related Information to be Measured*
Reservoir storage volumes, releases, and spills	Capacity Elevation Runoff Flood control storage Diversion targets Instream targets
Instream flow targets, deficits, and surpluses	Instream targets Runoff Storage Diversion targets Transport
Diversions/exports targets, deficits, and surpluses	Runoff Diversion targets Diversion limits Reservoir storage Groundwater pumping
Agricultural drainage volumes	Rainfall Irrigation Soils Drainage facilities

Water Use Efficiency	Urban water use efficiency and conservation measures Agriculture water use efficiency and conservation measures Diverted environmental water useefficiency and conservation measures
Remaining opportunities for water management	Spills/surplus outflow Unused conveyance Carryover storage Urban stormwater drainage volumes

E. Bay-Delta Hydrodynamics

Important Changes to be Evaluated	*Related Information to be Measured*
Delta outflow	Delta inflows Channel depletions Exports
X2 location	Outflow Tidal mixing
Channel flows at key Delta locations	Delta inflows Channel depletions Exports River diversions Transport
Water entrainment in diversions/exports	Delta inflows Channel depletions Exports River diversions

F. Flood Control System

Important Changes to be Evaluated	*Related Information to be Measured*
Hazards to the levee system	Overtopping failure (flood stage elevation) Mass failure (potential for erosion, stability, seepage, and seismic failure)
Changes in flood location, depth or duration	Flood modeling
Relative risk of levee failure	Hazards (potential failures)

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Levee improvements (project and nonproject levees)	
Levee design standards and guidelines	
Seismicity (risk of levee failure during a seismic event)	Levee structural integrity

G. Water Quality

Important Changes to be Evaluated	*Related Information to be Measured*
Ecosystem Water Quality	Metals: Cadmium Copper Mercury Selenium Zinc Organics/Pesticides Carbofuran Chlordane Chlorpyrifos DDT Diazinon Polychlorinated bipheyls (PCBs) Toxaphene Ammonia Dissolved oxygen Salinity (total dissolved solids [TDS], electroconductivity [EC]) Temperature Turbidity/Transparency
Urban Water Quality	Bromide Nutrients Pathogens Salinity Total organic carbon (TOC) Turbidity Viruses

Agricultural Water Quality	Boron Chloride Nutrients pH Salinity Sodium adsorption ratio (SAR) Turbidity Temperature

H. Geomorphology and Soils

Important Changes to be Evaluated	*Related Information to be Measured*
Surface soil erosion	Agricultural soil loss Wind Stormwater
Soil salinity	Soil geology Applied EC Agricultural drainage
Subsidence caused by peat oxidation	Peat content Soil moisture Ground disturbance and tilling practices
Subsidence caused by groundwater withdrawals	Groundwater levels Aquifer clay content

I. Air Quality

Important Changes to be Evaluated	*Related Information to be Measured*
Ozone	Construction activities Agricultural operations Pump operations
Carbon monoxide	Construction activities Agricultural operations Pump operations
Particulate matter	Construction activities Agricultural operations Pump operations Wind and soil conditions

J. Noise

Important Changes to be Evaluated

Short-term construction noise

Noise from aquatic recreation (i.e., boating)

Noise from terrestrial recreation (i.e., hunting)

Noise from facilities operation

K. Traffic and Navigation

Important Changes to be Evaluated

Navigation

Railways

Ferries

Airports

Roadways

II. BIOLOGICAL ENVIRONMENT

A. Fisheries and Aquatic Ecosystem

Important Changes to be Evaluated	*Related Information to be Measured*
Habitat	Flow including instream flow, net channel flow, tidal flow, estuarine salinity Temperature Substrate Physical Habitat Water Quality including agricultural salinity, thermal pollution, Dissolved oxygen, nutrient availability, toxicants, transparency Species interactions including predation, competition, disease, exotic plants

Foodweb support	Flow including instream flow, net channel flow, tidal flow, estuarine salinity
	Reservoir Elevation Temperature Substrate Habitat Physical Habitat
	Water quality including agricultural salinity, thermal pollution, dissolved oxygen, nutrient availability, toxicants, transparency
	Species Interactions including predation, competition, disease, exotic plants.
Access	Flow including instream flow, net channel flow, tidal flow, estuarine salinity
	Reservoir Elevation Temperature Physical Habitat Barriers
	Water Quality including agricultural salinity, thermal pollution, dissolved oxygen, nutrient availability, toxicants, transparency
	Species Interactions including predation, competition, disease, exotic plants.
Artificial Production	
Water Temperature Condition	Flow including instream flow, net channel flow, tidal flow, estuarine salinity
	Reservoir Elevation Temperature Barriers
	Water Quality including agricultural salinity, thermal pollution, dissolved oxygen, nutrient availability, toxicants, transparency
	Species Interactions including predation competition, disease, exotic plants.

Diversion	Physical Habitat Diversions
	Species Interactions including predation competition, disease, exotic plants.
Water Surface Level	Flow including instream flow, net channel flow, tidal flow, estuarine salinity
	Reservoir Elevation Substrate Physical Habitat
	Species Interactions including predation competition, disease, exotic plants
Toxicant Concentration	Flow including instream flow, net channel flow, tidal flow, estuarine salinity
	Reservoir Elevation
	Water Quality including agricultural salinity, thermal pollution, dissolved oxygen, nutrient availability, toxicants, transparency
	Species Interactions including predation competition, disease, exotic plants
Fishing	Fishing including timing, location, method, and rate
	Species Interactions including predation competition, disease, exotic plants
Predation	Physical Habitat Barriers Artificial Production
	Species Interactions including predation competition, disease, exotic plants

B. Vegetation and Wildlife

Important Changes to be Evaluated	*Related Information to be Measured*
Area and condition of habitat GIS based?	Open water and tidal wetlands Saline, brackish and freshwater wetlands Riparian and riverine habitats Upland habitats
Area of agricultural land use providing habitat value	
Agricultural operations and land use practices on habitat values	
Connection and orientation of habitats	
Changes in non indigenous/introduced species populations Qualitative	
Changes in ecological processes that sustain habitats	

C. Special Status Species and Communities

Important Changes to be Evaluated

Number of known populations of special-status species

Area and condition of habitat occupied by special-status species

III. ECONOMICS AND SOCIAL ENVIRONMENT

A. Land Use

Important Changes to be Evaluated

Acres in agricultural use

Acres in open space and habitat use

Acres in developed use

Indian trust assets

B. Agricultural Economics

Important Changes to be Evaluated	*Related Information to be Measured*
Value of agricultural production	Acres in production Crop prices Crop choices Crop yield
Cost of production	Cost of surface water used Groundwater costs Production costs Acres in agricultural production
Agricultural net income	Crop revenue Production costs Water transfers
Cost of water supply variability	Certainty in water supply and cost Indirect/third-party impacts
Costs of water agricultural water use efficiency	Irrigation efficiency and costs

C. Municipal and Industrial Water Supply Economics

Important Changes to be Evaluated	*Related Information to be Measured*
Cost of water supply	Surface-water supply and distribution Groundwater pumping costs Alternative water supplies and cost Water transfer costs Infrastructure costs for water conveyance and distribution
Cost of water shortage	Water supplies Consumer willingness to pay and demand elasticity
Cost of treatment	Quality of water supply Constraints to treatment
Cost of urban water use efficiency	

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D. Flood Control Economics

Important Changes to be Evaluated	
Potential flood damage and resources at risk	Existing and planned property values Existing and planned utility and infrastructure values Distribution of values lost from levee failure Natural resource values (including protected species) Cost of repair and rehabilitation of facilities after levee failure Maintenance of Delta water quality Values of resources at risk Cost of flood damage protection

E. Fish, Wildlife, and Recreation Economics

Important Changes to be Evaluated	*Related Information to be Measured*
Recreation-related spending	Recreation use and opportunity Distance traveled to recreation area
Recreation benefits	Value of recreation resource Recreation use and opportunity
Commercial fishing harvest values	Income Catch
Recreation employment and net income	

F. Regional Economics

Important Changes to be Evaluated	*Related Information to be Measured*
Income	Agricultural income Recreational expenditure Commercial fishing income Municipal and industrial water expenditure Indirect income (i.e., third-party effects)
Employment	Agricultural Recreation-related Commercial fishing Municipal and industrial water expenditure Indirect employment (i.e., third-party effects)

Fiscal conditions	Property tax revenues Sales tax revenues Public costs/costs of actions Indirect (i.e., third-party) fiscal effects

G. Power Production and Energy

Important Changes to be Evaluated	*Related Information to be Measured*
Quantity and value of energy produced	Reservoir elevation Reservoir releases Seasonal power value
Quantity and cost of energy consumed	Groundwater pumping Surface-water pumping Seasonal power costs

H. Recreation Resources

Important Changes to be Evaluated	*Related Information to be Measured*
Recreation opportunities	Resource conditions and availability
Recreation use	Regional population and demographics Demand for recreation resources

I. Visual Resources

Important Changes to be Evaluated
Visual quality
Viewer sensitivity

J. Cultural Resources

Important Changes to be Evaluated	*Related Information to be Measured*
Risk to prehistoric sites	Acreage of ground disturbance from construction Distribution of culturally sensitive land forms Locations of known sites
Risk to historic sites	Association of historic sites with land conditions Locations of known sites